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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/576,375

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Anders Oedegaard

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MARSHALL & MELHORN, LLC
FOUR SEAGATE - EIGHTH FLOOR
TOLEDO, OH 43604

EXAMINER

SCULLY, STEVEN M

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

06/23/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/576,375	OEDEGAARD ET AL.	
	Examiner	Art Unit	
	Steven Scully	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 March 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 37-61,71 and 72 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 37-61,71 and 72 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>3/31/2010</u> . | 6) <input type="checkbox"/> Other: _____ |

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**DEVICE AND METHOD FOR INCREASING THE CONCENTRATION OF FUEL IN A
LIQUID FLOW SUPPLIED TO THE ANODE OF A FUEL CELL**

Examiner: Scully S.N.: 10/576,375 Art Unit: 1795 June 18, 2010

DETAILED ACTION

1. The Amendment filed March 29, 2010 has been entered. Claims 37, 39, 44 and 54 have been amended, claims 62-70 are canceled and claims 71 and 72 are newly added. Accordingly, claims 37-61, 71 and 72 are pending in the application.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Specification

3. Previous objection to the specification is withdrawn due to the Amendment to the specification.

Claim Rejections - 35 USC § 112

4. The rejection of claims 37-61 under 35 U.S.C. 112, first paragraph, is withdrawn because applicant's arguments were found persuasive.

Claim Rejections - 35 USC § 102

5. Claims 37-39, 41-43, 45, 46, 54, 56-58, 60, 61 and 71 are rejected under 35 U.S.C. 102(e) as being anticipated by Zimmermann (US2004/0058222A1).

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With respect to claim 37, Zimmermann discloses a passive control of fuel concentration in a liquid feed fuel cell. The device comprises a fuel delivery subsystem 30 (applicant's fuel storage device) having a throughflow side 14 disposed therein. The device comprises a membrane (16) which swells upon contact with the methanol (22) and contact between the membrane (16) and the fuel mixture (24) in reservoir (14) causes methanol to migrate from the membrane (16) to the fuel reservoir (14), increasing the concentration of the methanol in the mixture of methanol and water. Preferably the membrane (16) is impermeable to water to thereby prevent the back migration of water from fuel reservoir (14) to methanol reservoir (12). See [0028].

With respect to claims 38, 39 and 71, Zimmermann discloses the system to be used with a direct methanol fuel cell. See [0005].

With respect to claim 41, Zimmermann discloses temperature differentials between the two reservoirs can adjust the equilibrium concentrations. See [0021]. Thus, a heating device would be necessary.

With respect to claims 42 and 43, Zimmermann discloses that the device comprises reservoirs (12, 14). These are interpreted as heat insulators comprising insulating material.

With respect to claim 45, Zimmermann discloses the system comprising a tank or container (12, 14).

With respect to claim 46, Zimmermann discloses the device contains fuel in pure or in concentrated form. See [0008].

With respect to claim 54, Zimmermann discloses the device comprises a channel 14 situated in the interior of the fuel storage device 30. See Figure 1.

With respect to claim 56, Zimmermann discloses the device comprises a filter, for example at membranes (36,38,40 and 16). See Figures 1 and 2.

With respect to claim 57, Zimmermann discloses the fuel and/or carrier component is a liquid. See [0014].

With respect to claims 58, 60 and 61, Zimmermann discloses the carrier component is water and the fuel is methanol. See abstract.

Claim Rejections - 35 USC § 103

6. Claims 44, 47, 48, 51, 52, 55 and 72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmermann (US2004/0058222) as applied to claims 37-39, 41-46, 54, 56-58, 60 and 61 above.

With respect to claim 47, Zimmermann does not disclose the particular fuel concentration claimed. However, Zimmermann recognizes concentration range to be a relevant factor in developing a system for controlling the concentration of methanol in the system. See [0006]. It would have been obvious to one of ordinary skill in the art to vary the concentration of the fuel based on its intended use. Further, it is the position of the examiner that the fuel concentration is not critical.

With respect to claims 48 and 52, Zimmermann does not explicitly disclose a support or stabilizing device. However, obviously it is beneficial to provide a supportive structure to a system to prevent physical damage.

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With respect to claim 51, Zimmermann does not disclose the throughflow rate. However, Zimmermann recognizes size is a relevant factor in developing a system for controlling the concentration of methanol in the system. See [0006]. Depending on the size of the membrane, the throughflow rate in ml/min would vary. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to adjust the size of the liquid feed depending on the intended use (i.e. intended flow rate to a fuel cell).

With respect to claim 55, Zimmermann does not disclose the cross-section of the channel. However, it is commonly known to make a pipe-like device circular in cross-section. Further, it is the position of the examiner that the shape of the membrane is not critical.

With respect to claims 44 and 72, Zimmermann does not disclose a spiral throughloop. However, depending on the residence time, it would be obvious to one of ordinary skill in the art at the time of the invention to recycle the outlet stream from the device back into the device to insure the proper methanol concentration is achieved if the residence time was too small.

7. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmermann (US2004/0058222) as applied to claims 37-39, 41-46, 54, 56-58, 60 and 61 above, and further in view of Neutzler et al. (US2002/0076599)

With respect to claim 40, Zimmermann discloses a direct methanol fuel cell which creates water. Neutzler et al. disclose a direct methanol fuel cell including a water

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management system. To aid in supplying methanol and water to the anode, it would be beneficial to recirculate the aqueous fuel mixture after the fuel cell reaction, and recycle the water generated at the cathode in the fuel cell reaction, as well as the water arriving at the cathode via diffusion and electro-osmotic drag. See [0005]. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to include a recycling feed of the water from the cathode to the inlet fuel in order to aid in supplying methanol and water to the anode.

8. Claims 49 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmermann (US2004/0058222) as applied to claims 37-39, 41-46, 54, 56-58, 60 and 61 above, and further in view of Beisswenger et al. (US2004/0003720)

With respect to claims 49 and 53, Zimmermann does not disclose a support structure comprising a foamed material. Beisswenger et al. disclose a system for hydrogen separation. The separation device is a membrane. See [0009]. Beisswenger et al. further disclose a support structure (8) on the membrane made of a foamed material. This foam is used to provide support for the membrane. See [0057]. It would have been obvious to one of ordinary skill in the art at the time of the invention to include a foamed support on the separation membrane of Zimmermann because it provides support for the membrane.

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9. Claims 50 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zimmermann (US2004/0058222) as applied to claims 37-39, 41-46, 54, 56-58, 60 and 61 above, and further in view of Shurtleff (US2003/0228252).

With respect to claim 50, Zimmermann does not disclose the membrane is a perfluorosulfonic acid/polytetrafluoroethylene copolymer in acidic form. Shurtleff discloses Nafion (PFSA/PTFE) is a water-selective membrane which can be used to remove the water from a system. See [0037-0039]. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the membrane of Shurtleff because it provides a selective membrane for separation.

With respect to claim 59, Nafion inherently releases sulfonic acid and therefore the methanol/water mixture would inherently comprise an acid.

Response to Arguments

10. Applicant's arguments filed March 29, 2010 have been fully considered but they are not persuasive. Applicant argues:

a) Zimmermann does not disclose designing the "chamber" which contains the mixture of fuel and water as a throughflow device, which is disposed in the interior of the other "chamber"(fuel storage device or tank, respectively).

The Examiner respectfully disagrees. Zimmermann discloses a fuel storage device 30 comprising a throughflow device 14 in the interior thereof. See Figure 2. Further arguments regarding Zimmermann are believed to not be commensurate with the scope of the claimed invention.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact/Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven Scully whose telephone number is (571)270-5267. The examiner can normally be reached on Monday to Friday 7:30am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571)272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. S./

Examiner, Art Unit 1795

/Dah-Wei D. Yuan/

Supervisory Patent Examiner, Art Unit 1795